RocketRAID 3xxx
SATAII Host Adapter
User's Guide

HighPoint

Revision: 1.2

Date: November 2007

HighPoint Technologies, Inc.

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Chapter 1
Introduction

Contents of this Chapter:

About this guide
Introducing the RocketRAID 3xxx Host Adapter
RocketRAID3xxx - Features and Specifications
Understanding RAID Concepts and Terminology

About this Guide

The RocketRAID 3xxx SATAII Host Adapter's User's Guide provides information about the functions and capabilities of the host adapter, and instructions for installing, configuring and maintaining RAID arrays hosted by the adapter.

Introducing the RocketRAID 3xxx Host Adapter

The HighPoint RocketRAID 3xxx is an 8-channel PCI-E x8 to Serial ATA II RAID controller. The RocketRAID 3xxx solution designed for enterprise storage applications such as NAS solutions, workgroup and web servers, video streaming / video editing workstations, data archiving/back up, and security systems.

The RocketRAID 3xxx delivers optimized performance and features through the use of HighPoint's industry-leading RAID technology.

The HighPoint RocketRAID 3xxx PCI-E SATA II RAID Controller offers the features needed for enterprise level storage environments. The RocketRAID 3xxx is the latest product in storage technology, combining the outstanding high-performance capabilities of SATA II, with enterprise storage features, such as Native Command Queuing (NCQ), staggered drive spin-up, and SAF-TE enclosure management.

The mini-SAS (RocketRAID 3220 & RocketRAID 35xx) Interconnect System - Unparalleled flexibility and outstanding performance

The RocketRAID 3xxx supports a variety of connectors and cable assemblies that make installation a snap, and ensure compatibility with a wide array of storage chassis and enclosures. These assemblies enable flexible approach to speed-dependent applications, ranging from 1.5 to 6.0 Gbps, with maximum capabilities up to 10.0 Gbps. The RocketRAID 3xxx is an ideal and versatile multi-faceted solution for the growing server storage market.

Intel I/O Processor and RAID Off-load Engine

The RocketRAID 3xxx utilizes the Intel hardware I/O processor for RAID 6 and 5 parity calculations. The Off-load engine relieves the mainboard's CPU from the burden of RAID-related computations, allowing it to attend to other important system tasks.

Onboard Cache and Optional Battery Backup for optimal performance and added security

256MB of DDR SDRAM with ECC protection is integrated into the RocketRAID 3xxx for improved performance, and provides additional security in the case of critical system failure, when used in conjunction with the optional battery back up unit.

RocketRAID 3xxx – Features and Specifications

Host Adapter Architecture

- Intel IOP
- PCI -Express x8 (x16 slot compatible)
- 256 MB of DDR II memory with ECC protection (for RocketRAID 3320/35xx)
- Write through and write back cache
- 8 SATA II channels at 3Gb/s per port
- Multi -adapter support up to 4 adapters
- BIOS booting support
- BIOS PnP and BBS (BIOS boot specification) support
- Intel RAID 6 Engine for large capacity RAID arrays
- Battery Backup Unit (BBU) Optional (for RocketRAID 3320/35xx)
- RoHS compliant

Advance RAID Features

- Support RAID 0, 1, 5, 10, 50, 6 and JBOD
- Multiple RAID support
- Multiple Logical Drive Support
- Online array roaming
- Online capacity expansion (OCE) and Online RAID level migration (ORLM)
- Quick and Background initialization for instant RAID configuration
- Automatic drive insertion / removal detection and rebuild
- 64bit LBA support greater than 2TB per volume
- S.M.A.R.T monitoring hard drive status for reliability
- Staggered Spinup with user selection in BIOS
- (MAID) Spin down drives in array is idle
- (VSS) Variable Sector Size

Array Monitors, Alerts and Indicators

- Active/Failed LED
- SMTP for email notification
- Alarm / Buzzer alerts for array activity

RAID Management

- Firmware update in the Operating System
- Hot key (ctrl-h) boot-up RAID manager via BIOS
- API library for customizing AP
- Command Line Interface (CLI)
- Web browser-base RAID management software
- Disk scrubbing to prevent degraded RAID arrays
- Bad sector repair and re-mapping to reduce dropped drives
- ATA pass-through mode support

Operating System Support

- Windows (2000, XP, 2003, Vista 32/64bit)
- Mac OS X 10.4.x, 10.5.x
- Linux (GPL Licensed Linux Open Source Driver into Kernel 2.6)
- FreeBSD

PHYSICAL SPECIFICATIONS

Size: (160.0mm x 66.0mm) 6.26”L x 2.59”

WEMI : FCC Part 15 Class B and CE

Thermal and Atmospheric Characteristics:

Work Temperature Range : +5C ~+ 55C

Relative Humidity Range : 5% ~ 60% non condensing

Storage Temperature : ~20 ~ 80C

MTBF: 920,585 Hours

Electrical Characteristics:

PCI-e : 3.3v

Power: 10 W

Understanding RAID Concepts and Terminology

The following concepts and terminology is commonly used when describing the functions of the RocketRAID 3xxx Host Adapter.

Disk initialization

Initializing a disk writes necessary RAID configuration information to that disk. Disks must be initialized before configuring them into RAID arrays. The initialization process will destroy all data on the disk.

Disk Status

New	The disk contains no data and has not been initialized.
Initialized	The disk has been initialized and can be used for array creation.
Configured	The disk has been assigned to one or more arrays, or configured as a spare disk.
Legacy	The disk was used on other controllers before use with the RocketRAID 3xxx (see *legacy disk* below).

Array initialization

A redundant array (RAID5, RAID1, RAID10, RAID50/6) needs to be initialized to ensure full performance and reliability. Non-redundant arrays (RAID0, JBOD) do not need to be initialized.

When you create a redundant array using the RocketRAID 3xxx controller's BIOS Configuration Utility, it will automatically start the initialization process. When creating an array using the HighPoint RAID Management Console software, you can specify an initialization option (Skip initialization, foreground and background).

Online Capacity Expansion (OCE)

This feature allows disks to be added to existing RAID arrays, in order to increase the array's capacity, without fear of data loss. Any number of disks can be added to an array, at any time. Data can be accessed and utilized even while being redistributed.

Online RAID Level Migration

This term describes the ability to change one type of array (RAID level), into a different type of array (changing a RAID 1 array into a RAID 10 array for example). Data is still accessible during the migration process, and a base level of security is still active.

OCE, ORLM and the RocketRAID 3xxx

The RocketRAID 3xxx supports both Online Capacity Expansion (OCE), and Online RAID Level Migration (ORLM). Both features are supported by a single function - an array can be transformed from one RAID level to another RAID level while simultaneously being resized, even under I/O load.

Spare disk

A spare disk is a single disk that can be used to automatically rebuild a redundant array in case of drive failure. Spare disks may also be members of a RAID array. Any available space on these disks may be used to rebuild other broken arrays.

Legacy disk

Disks attached to the RocketRAID 3xxx that contain valid partition tables will be identified as legacy disks. A legacy disk attached to the RocketRAID 3xxx can be accessed by the operating system, but cannot be used to create RAID arrays. A legacy disk must be initialized before assigning it to an array.

Chapter 2
RocketRAID 3xxx
Hardware Description/Installation

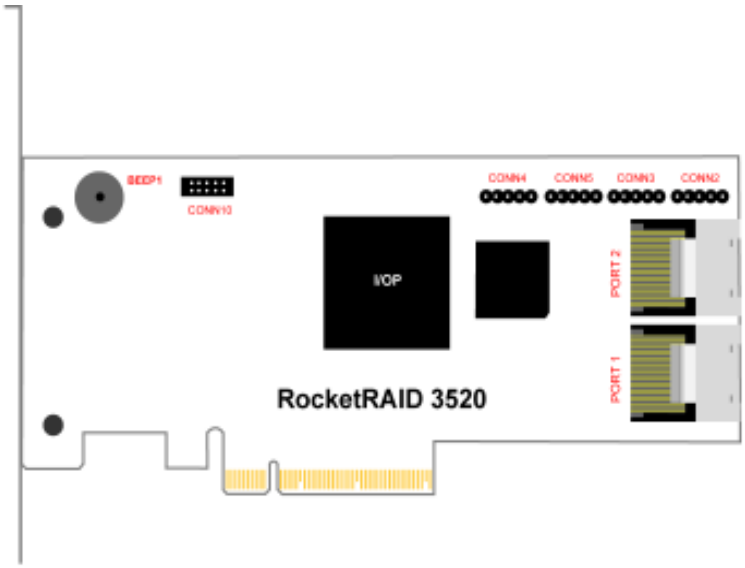
Contents of this Chapter:

RocketRAID 3xxx Hardware
1 - RocketRAID 3xxx Adapter Layout
2 - Installing the RocketRAID 3xxx Host Adapter
3 - Verifying Installation
4 - Battery Backup (for RocketRAID 3320/35xx)

RocketRAID 3xxx Hardware

RocketRAID 3xxx Adapter Layout

1 - RocketRAID 3520 Adapter Layout



Port1, Port 2

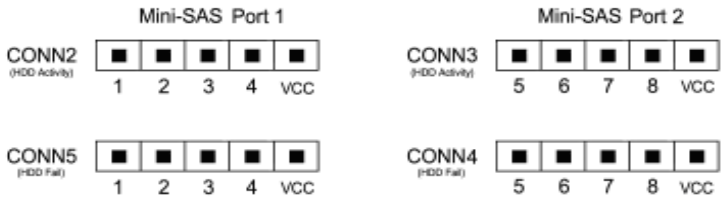
These represent the RocketRAID 3520's two internal Mini-SAS ports. Each port can support up to 4 hard disks.

CONN2-CONN5 - Active LED, Fail LED

LED connectors (disk-activity/disk-failure).

The RocketRAID 3520 has 4 LED jumpers. 2 Jumpers are provided for each Mini-SAS port.

The numbered pins (1-4, 5-8) represent each of the channels (hard disks).



For more information about LED support, contact our Customer Support Department.

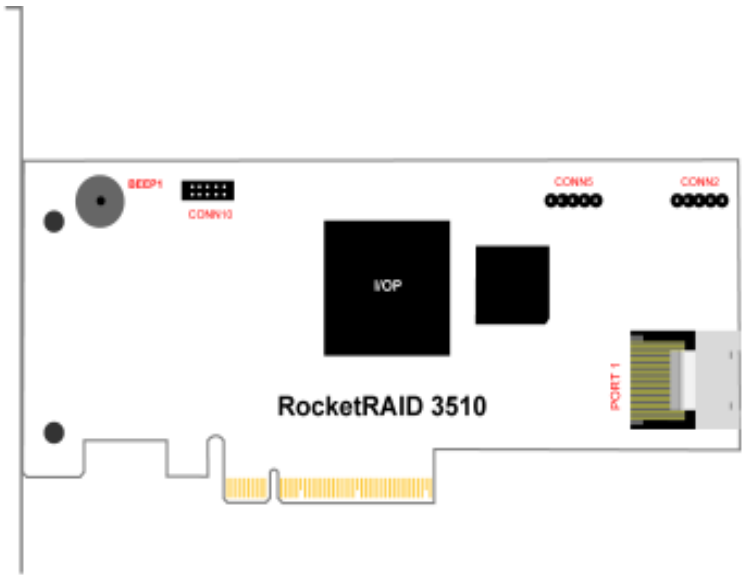
BEEP1 – Speaker

Alarm (speaker): the speaker emits and audible alarm in the case of disk/array failure.

CONN10 (BBU)

Connector for battery backup (optional part).

2 - RocketRAID 3510 Adapter Layout



Port1

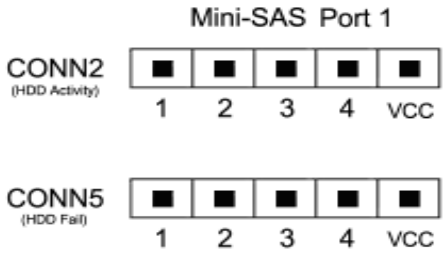
This represent the RocketRAID 3510's one internal Mini-SAS port. One port can support up to 4 hard disks.

CONN2, CONN5 - Active LED, Fail LED

LED connectors (disk-activity/disk-failure).

The RocketRAID 3510 has 2 LED jumpers. Each Jumpers are provided for one Mini-SAS port.

The numbered pins (1-4) represent each of the channels (hard disks).



For more information about LED support, contact our Customer Support Department.

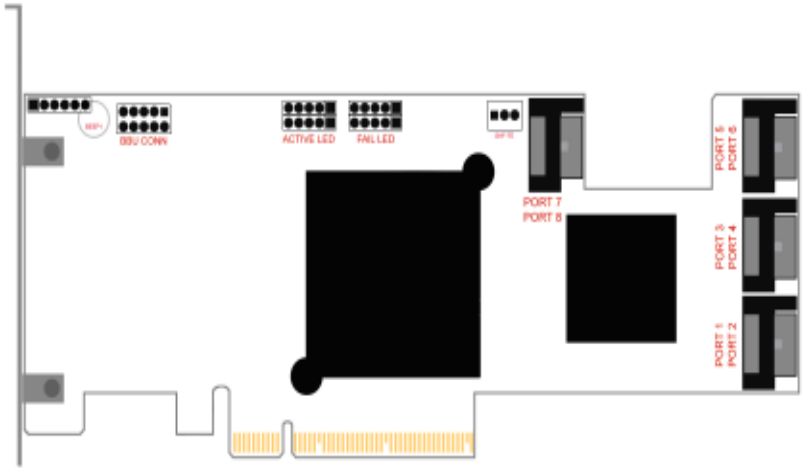
BEEP1 – Speaker

Alarm (speaker): the speaker emits and audible alarm in the case of disk/array failure.

CONN10 (BBU)

Connector for battery backup (optional part).

3 - RocketRAID 3320 Adapter Layout



Port1 – Port 8

These represent the RocketRAID 3320's eight SATA channels.

SAF-TE

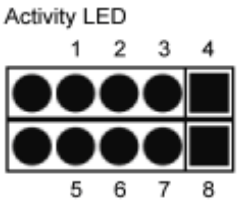
SAF-TE port. This support is dependent upon the system chassis. Not all chassis models support SAF-TE features. Consult the chassis's manual for more information.

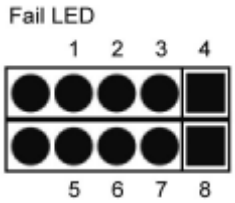
ACTIVE LED, FAIL LED

LED connectors (disk-activity/disk-failure).

The RocketRAID 3320 has 4 LED jumpers, set in banks of two. 2 Jumpers are provided for Disk Activity, and 2 are provided for Disk Failure.

The numbered pins (1-4, 5-8) represent each of the channels (hard disks).





RocketRAID 3320 LED Guide

For more information about LED support, and installation guides for various chassis configurations, consult the RocketRAID 3320 LED Guide (which will be available for download), or contact our Customer Support Department.

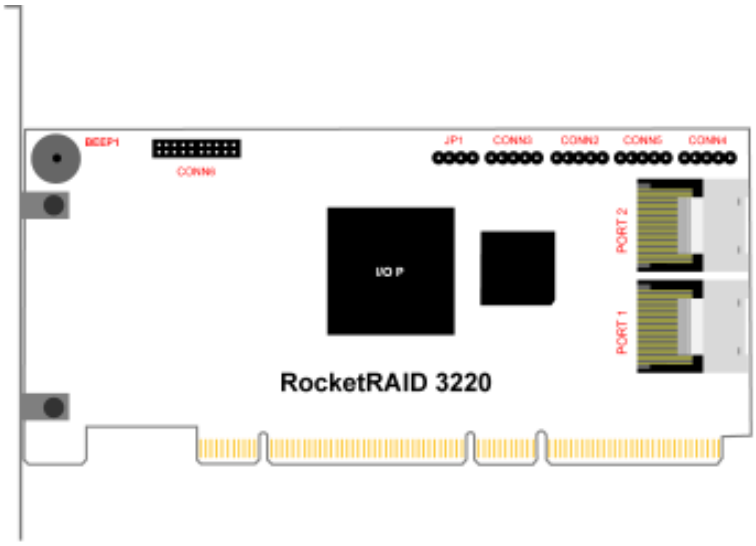
BEEP1 – Speaker (attached to reverse side of card)

Alarm (speaker): the speaker emits and audible alarm in the case of disk/array failure.

BBU CONN

Connector for battery backup (optional part).

4 - RocketRAID 3220 Adapter Layout



Port1, Port2

These represent the RocketRAID 3220's two internal Mini-SAS ports. Each port is compatible with a variety of cable options.

JP1

SAF-TE support: this support is dependent upon the system chassis. Not all chassis models support SAF-TE features. Consult the chassis's manual for more information.

CONN2 - CONN5

LED connectors (disk-activity/disk-failure): LED support is discussed in greater detail in the LED Connection section, and in a separate document, the RocketRAID 3220 LED guide (which discusses LED installation for server chassis). The LED Guide will be available for download, from our website.

The RocketRAID 3220 has 4 LED jumpers - CONN2, CONN3, CONN4, and CONN5. The following diagrams describe the connector pin definitions for the Disk Activity jumpers (CONN2, CONN3), and Disk Failure connections (CONN4, CONN5).

The numbered pins (1-4, 5-8) represent each of the 8 channels (hard disks).

The fifth pin of each CONN is for power (3.3v).

Mini-SAS Port 1 (disks 1-4)

Mini-SAS Port 2 (disks 5-8)

RocketRAID 3220 LED Guide

For more information about LED support, and installation guides for various chassis configurations, consult the RocketRAID 3220 LED Guide (which will be available for download), or contact our Customer Support Department.

BEEP1 - Speaker

Alarm (speaker): the speaker emits and audible alarm in the case of disk/array failure.

CONN6

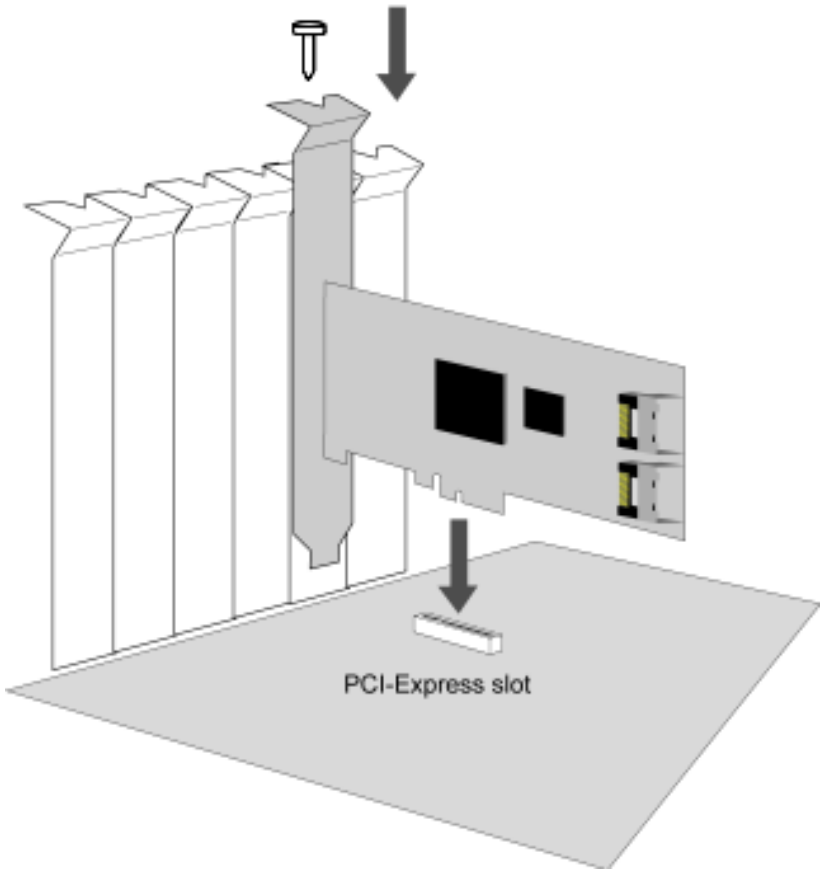
Connector for battery backup (optional part).

2 - Installing the RocketRAID 3xxx Host Adapter

Note: Make sure the system is powered-off before installing the RocketRAID 3xxx host adapter.

The RocketRAID 3xxx includes both standard and low-profile brackets. It may be necessary to attach the low-profile bracket in place of the standard bracket, depending upon the chassis design.

1. Open the system chassis and locate an unused PCI-E x8 (or x16) slot.
2. Remove the PCI slot cover.
3. Gently insert the RocketRAID 3xxx into the PCI-E slot, and secure the bracket to the system chassis.



4. After installing the adapter, attach hard disks to the RocketRAID 3xxx the appropriate Mini-SAS cables.
5. Many server-level chassis include hard-disk hot-swap bays. For these system chassis, cables are attached to the chassis backplane, rather than directly to each individual hard disk. Consult the chassis's manual for proper installation procedures.
6. Close and secure the system chassis.

3 - Verifying Installation

Once the RocketRAID 3xxx host adapter and hard disks have been installed into the chassis, boot-up the system to verify that the hardware is properly recognized.

1. Power on the system. If the system detects the presence of the adapter, the RocketRAID 3xxx BIOS Utility will be displayed during bootup.
2. Press **Ctrl+H** to access the RocketRAID 3xxx BIOS Utility.

The BIOS Utility will display information about hard disks attached to the adapter. Make sure all attached disks are detected by this utility. If any of the hard disks are not detected, power down the system and check the power and data cable connections.

4 - Battery Backup (RocketRAID 3320 & RocketRAID 35xx)

A battery backup option will be available as an optional add-on component.

The battery provides additional data security in case of a critical system failure.

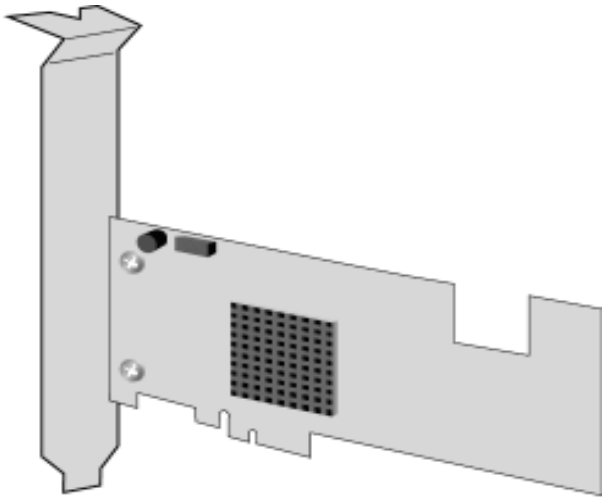
Data normally lost during a major system fault, such as a power outage or CPU failure, which was in transit at the time of the failure (stored in the card's onboard cache), will remain viable for up to 48 hours.

The battery unit can be attached to the card using the BBU CONN (see page 4).

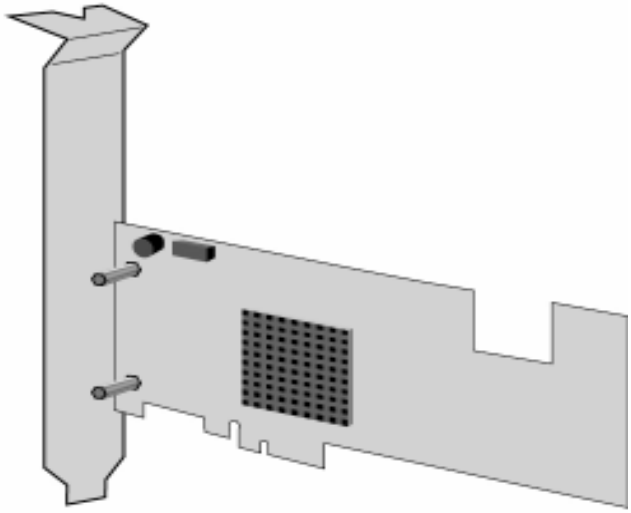
Attach this CONN to Item C in the diagram below, using the cable included with the BBU unit.

Installing the HighPoint BBU

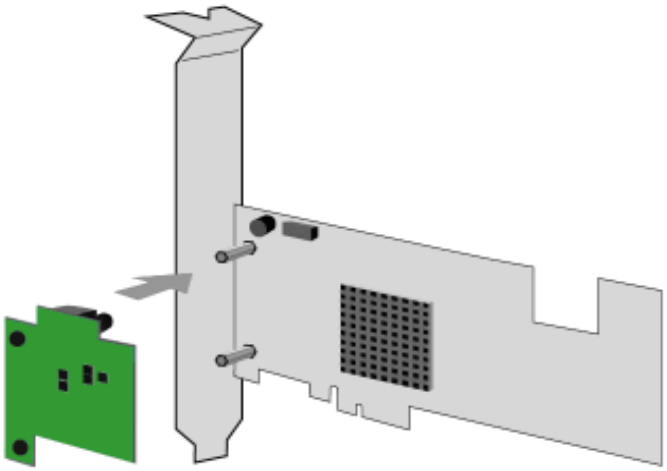
Step1: Remove the 2 bracket screws:



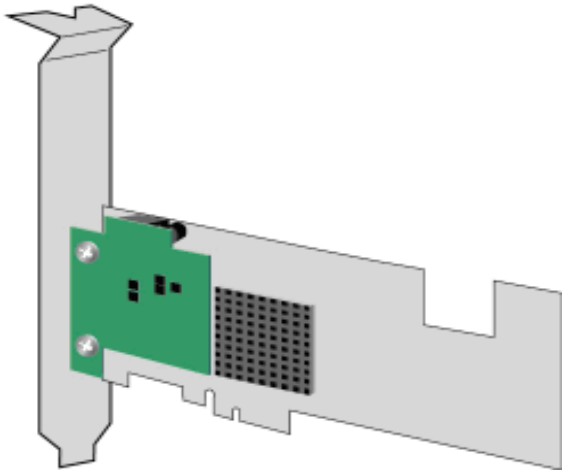
Step2 : Install the copper spacers:



Step3: Attach the BBU unit into CONN 10:



Step4: Refasten the bracket screws:



Chapter 3
RocketRAID 3xxx BIOS Utility

Contents of this Chapter:

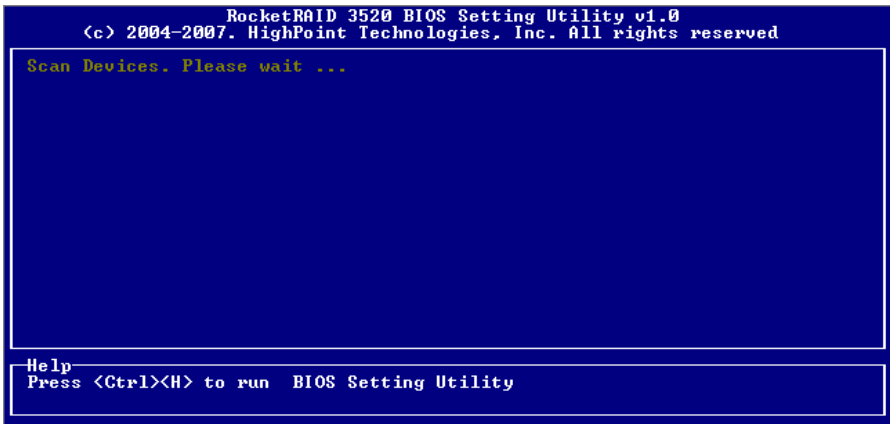
RocketRAID 3xxx BIOS Utility
1 - BIOS Command Overview
2 - Creating RAID Arrays
3 - Adding/Removing Spare Disks
4 - Updating the Firmware

RocketRAID 3xxx BIOS Utility

The RocketRAID 3xxx's BIOS Utility can be accessed using the "Ctrl+H" command. This command should be displayed automatically when the RocketRAID 3xxx's BIOS screen appears during the system's boot up procedure.

1 - BIOS Command Overview

The RocketRAID 3xxx BIOS Utility provides a wide selection of RAID related commands. These commands are displayed towards the top of the utility's interface.


RocketRAID 3520 BIOS Setting Utility v1.0
(c) 2004-2007. HighPoint Technologies, Inc. All rights reserved
Scan Devices. Please wait ...
Help
Press <Ctrl><H> to run BIOS Setting Utility

Use the ← →arrow keys to scroll through the various commands, and the ↑ ↓ arrows to browse through the corresponding command menus. Use the ENTER key to execute the selected command.

The ESC button can be used to cancel the selected command, or return to the previous command menu.

Create - this command is used to create RAID arrays. Section 2 discusses this command in detail.

Delete - this command will delete the selected RAID array.

Warning: *This command may result in permanent data loss - it should only be used if data stored on the target array is no longer relevant, or has been backed up to an alternate storage device.*

Add/Remove Spare - this command is used to assign hard disks to function as spare disks. The controller is capable of using spare disks to automatically rebuild broken or faulted RAID arrays.
Section 3 discusses this command in detail.

Settings

Select Boot Device - this function is used to designate a particular disk or RAID array to function as the RocketRAID 3xxx's boot device.

Note: *This setting is only relevant if the motherboard's BIOS has set the* RocketRAID 3xxx *to function as the system's primary boot device.*

Parameter Settings – various controller/device parameters

Staggered spinup – This function is used to enable (or disable) staggered drive spin up support This setting, by default, is disabled.

Number of drives per spinup – informs the RocketRAID 3xxx how many disks should be powered up simultaneously (when the Staggered spin up feature is enabled).

Delay between spinup (seconds) – used to set the amount of time the RocketRAID 3xxx will wait between issuing Staggered spinup commands.

Rebuild Priority – specify the RocketRAID 3xxx's rebuild priority (resources dedicated to rebuilding an array). There are five selections, ranging from Lowest to Highest priority.

Spindown Idle Disk (MAID) – Advanced HDD power management option. If this option is enabled the idle hard disk will be set to standby mode automatically and will be automatic wake up when HDD receive any regular command.

Audible alarm – This setting is enabled by default. Used to enable/disable the on card Buzzer alarm.

Auto rebuild – This setting is disabled by default. Used to enable/disable automatic RAID rebuild and reconstruction for degraded array.

Single BCV Entry – Single Boot Connection Vector. Used to register RAID adapter's logical disks to System BIOS: "enable" only register first logical

disk to system BIOS, "disable" register all logical disks to system BIOS.

INT 13 Support – This setting is enabled by default. Disabling this setting will disable the RocketRAID 3xxx's bootable support. The motherboard should no longer treat the host adapter as a bootable device.

Stop on Error – This setting is enabled by default. Disabling this option will prompt the RocketRAID 3xxx to automatically skip error messages during bootup (broken array warnings), if the administrator does not input the "Control + H" command to access the BIOS menu.

View – this command is used to view information about the RocketRAID 3xxx, and devices attached to it..

Devices – displays information about hard disks attached to the RocketRAID 3xxx. Use the ↑ ↓ arrow keys to highlight the target hard disk, and press ENTER to view the information.

RAID Array – displays information about RAID arrays attached to the RocketRAID 3xxx. Use the ↑ ↓ arrow keys to highlight the target array, and press ENTER to view the information.

Controller – displays information about the RocketRAID 3xxx, including the card model, firmware revision, onboard memory, PCI slot location and BBU (Battery Backup Unit) information if BBU is installed.

Rescan Devices – This option will rescan all of the physical devices attached to the RAID controller.

Initialize - this function is used to prepare disks for use with RAID arrays.

Note: *Arrays cannot be created between disks that have not been initialized. The following section discusses this command in detail.*

2 - Creating RAID Arrays

Initializing Disks:

Before creating a RAID array, the disks must be initialized.
Initialization writes necessary RAID configuration information to the hard disk.
Use the ← → arrow keys to select the **Initialize** command, and press ENTER.
Warning: Initialization will destroy all pre-existing data on the selected hard disks.
Use the ↑ ↓ arrow keys to highlight the target hard disk(s) and press ENTER. Next, press the **Y** (yes) key to initialize the selected disk(s), or **N** (no) key to cancel the initialization process.
Once initialized, these disks can be utilized to create RAID arrays.

To create an array:

1. Use the ← → arrow keys to highlight the **Create** command, and press ENTER to open the Create Menu.
2. Use the ↑ ↓ arrow keys to select the appropriate RAID level, then press ENTER.
3. Next, use the ↓ arrow key to highlight the **Array Name** option and press ENTER. The array name dialogue box will appear. Use the keyboard to input a new Array Name, and press the Enter key.

   Note: the Array Name command is optional – it is not necessary to name the array. The array can be named at a later time, and the name of the array can be changed at any time.

4. On the Create menu, use the ↓ arrow key to highlight the **Select Devices** item and press ENTER. A device list will appear, and display all available hard disk drives.
5. Highlight the target disks that you want to use, and press ENTER to select them. After all of the disks have been selected, press the ESC key to return to the Create Menu.
6. Next, Use the ↓ arrow key to highlight the **Capacity (GB)** option and press ENTER. The total available capacity will be displayed. Press ENTER if you wish to use all available space.
7. If you wish to reserve disk space for additional arrays/single disks, use the keyboard to input the amount of space (in GB) you wish to set aside for this particular array, and press ENTER.

Note: Multiple arrays can be created using the same set of hard disk drives. The Capacity option allows you to set aside disk space that be used to create another array, set as a spare disk, or partitioned to act as a single disk (by the operating system).

8. To complete the creation procedure, use the ↓ arrow key to highlight the **Start Creation** item and press ENTER. Press the **Y** (yes) key to create the array, or **N** (no) key to cancel the creation process.

9. **cache policy:** If you are creating RAID 5 or RAID6, you will be asked to specify a cache policy.

   Write-back - When a cache is operating in write-back mode, data written into the cache is not immediately written out to its destination in secondary storage unless the heuristics governing the flushing of dirty data demands otherwise. This methodology can improve the efficiency of write operations under favorable circumstances. However, its use can potentially lead to incoherences in a system that is not protected from power fluctuations or other failures.

   Write-through - When a cache is operating in write-through mode, data written into the cache is also written to the destination secondary storage devices. Essentially write completion does not occur until the data is written to secondary storage. Thus the contents of the cache and the secondary storage are always consistent. The advantage is that the possibility of data corruption is greatly reduced. The disadvantage is that write-through operations are more time consuming.

10. **Sector Size (VSS)**: Variable Sector Size (VSS) for over 2TB support in 32bit LBA OS. It changes the sector size from default 512 Bytes to 4k Bytes, the maximum volume capacity up to 16TB. This option works under Windows platform only. And it CAN NOT be converted to Dynamic Disk, because 4k sector size is not a standard format.

Note: The VSS can not support bootable array and Change Sector Size.

3 - Adding/Remove Spare Disks

This command is used to assign a hard disk to act as a Spare Disk.

Spare Disks are used to automatically rebuild Redundant RAID arrays (RAID 1, 5, 6, 10, 50) in the case of disk failure. To set a hard disk to act as a Spare Disk, use the ↑ ↓ arrow keys to select a disk, and press ENTER.

To remove the Spare Disk setting from a hard disk, highlight the spare disk, and press ENTER.

Generally, single disks are designated to act as spares (disks that are not configured into RAID arrays).

However, in some instances, disks that are members of RAID arrays may also be designated to act as a spare. If the disks in question are part of a RAID array that did not utilize the full available capacity at the time of creation, these disks may be used as spares.

For example: a RAID 0 array was created between two 200GB hard disks, but only 200GB of space (out of a grand total of 400GB), was assigned to that array. In this example, 200GB of disk space remains unallocated. This unallocated space would allow these disks to be set as spares for a separate redundant array that falls into the same capacity range (200GB).

Note: Spare property will disappear when Max Available Capacity is low than 1G

4 - Updating the Firmware

Firmware updates are released periodically, and posted on our website for download. There are several ways to update the HPTIOP firmware.

For Windows based operating systems:

1) Download the desired Firmware/BIOS update from the Support section provided for the HPTIOP adapter. Extract the download to the directory of your choice.
2) Open a DOS prompt window, and browse to this directory.
3) Run the flashhelf-win.exe utility:

   flashelf-win xxx.xxx

Note: *xxx.xxx* = the name of the Firmare image file (type it exactly as it appears).

The utility will notify you when the card has been successfully updated. You can now close the DOS prompt window.

For other operating systems:

In order to update the firmware, the system must be booted into DOS mode, using a DOS-boot diskette or CD image.

1) Copy the flashelf.exe and the bios image file to the bootable floppy diskette (you may need to use a different floppy depending upon how much space is available on the boot diskette - this can vary).
2) If you are booting from a CD image, you will need to add these files to the CD.
   Insert the boot image media into the appropriate drive, and boot the system.
3) Once the A:\> prompt has appeared, insert the media that contains the required Firmare files, and type the following command:
   flashelf xxx.xxx
   Then, press ENTER.
   Note: *xxx.xxx* = the name of the Firmware image file (type it exactly as it appears).
   The utility will notify you when the card has been successfully updated.
   Once complete, the system can be rebooted.

Chapter 4
RocketRAID 3xxx Driver and Software Installation Microsoft Windows (2000, XP, 2003 Server, x64 versions, Vista)

Contents of this Chapter:

Driver and Software CD

Windows Driver Installation

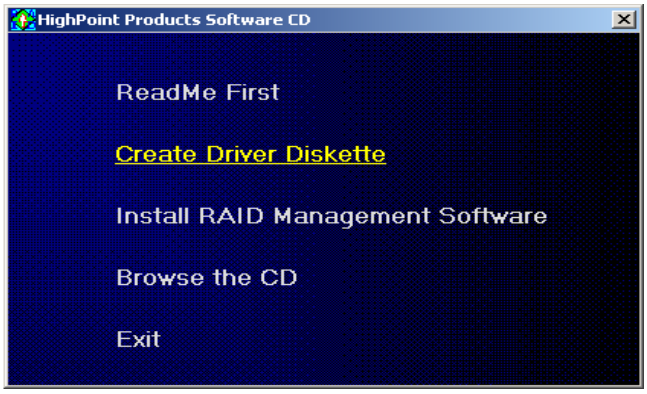
HighPoint

Driver and Software CD

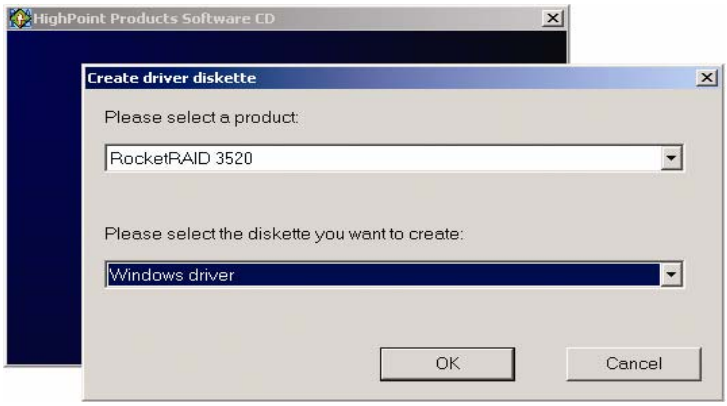
The RocketRAID 3xxx retail box includes a Driver and Software CD.
This CD can be used to generate driver diskettes, and install the RAID Management software for a variety of operating systems.

To create a driver diskette:

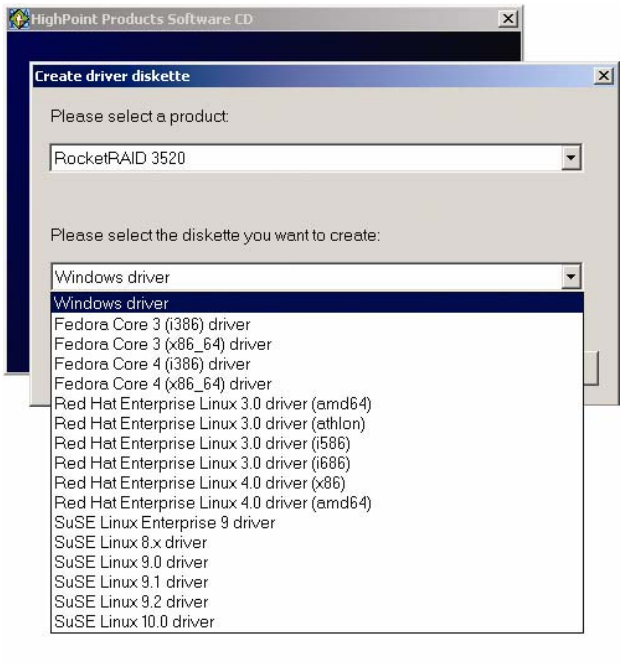
1. Insert the CD into the system's CD/DVD drive. The program should start automatically.
2. Insert a blank floppy diskette into the system's floppy drive.
3. Click on "Create Driver Diskette".



4. Click on the "Please Select a Product" drop-down button, and select "RocketRAID 3xxx" from the list.



5. Click on the “Please Select the Diskette you want to create” drop-down button, and select the appropriate OS from the list.


HighPoint Products Software CD
Create driver diskette
Please select a product:
RocketRAID 3520
Please select the diskette you want to create:
Windows driver
Windows driver
Fedora Core 3 (i386) driver
Fedora Core 3 (x86_64) driver
Fedora Core 4 (i386) driver
Fedora Core 4 (x86_64) driver
Red Hat Enterprise Linux 3.0 driver (amd64)
Red Hat Enterprise Linux 3.0 driver (athlon)
Red Hat Enterprise Linux 3.0 driver (i586)
Red Hat Enterprise Linux 3.0 driver (i686)
Red Hat Enterprise Linux 4.0 driver (x86)
Red Hat Enterprise Linux 4.0 driver (amd64)
SuSE Linux Enterprise 9 driver
SuSE Linux 8.x driver
SuSE Linux 9.0 driver
SuSE Linux 9.1 driver
SuSE Linux 9.2 driver
SuSE Linux 10.0 driver

6. Click on the “OK” button to create the driver diskette.

To install the RAID software:

1. Click on “Install RAID Management Software”.

2. Select the desired software from the drop down menu, and click on the "OK" button.

Windows Driver Installation

Before installing the RocketRAID 3xxx device driver, make sure the RocketRAID 3xxx host adapter and all required hard disks have been installed into the system's chassis (refer to the Hardware Installation section).

Installing the RocketRAID 3xxx driver for an existing Windows XP/ 2003/x64 system

After the operating system has booted, Windows will automatically detect the RocketRAID 3xxx, and request that a device driver be installed. To install the device driver, follow the steps outlined below:

1. When the "Found New Hardware Wizard" window appears, select "Install from a list or specific location (Advanced)", and click Next to continue.
2. Click on the "Include this location in the search" option, and select the system's floppy drive (generally Disk A). Next, insert the Driver Installation diskette into the system's floppy drive.
3. At the Hardware Wizard screen, select the floppy drive as the source, then click the Next button. Select the appropriate operating system folder, then, click the Next button.
4. Windows might display a warning message that states the driver has "not been signed". Select "Continue Anyway", then, click Finish when prompted. When Windows asks to reboot the system, choose No.
5. Remove the Driver Installation diskette from the floppy drive.

Installation Verification

After the driver has been installed, and the system has been restarted:

1. Click the Start button, select "Settings", then select "Control panel", double click "System" item.
2. In the popup window, select Hardware tab and then click Device Manager button.

3. Double click the "SCSI and RAID controllers" entry. If the RocketRAID 3xxx device entry is not displayed, or there are "?" or "!" marks displayed near the RocketRAID 3xxx entry, the driver has not been installed properly. Delete the entries and reinstall the driver.

Installing the RocketRAID 3xxx driver during a fresh Windows 2000/ XP/2003/x64 installation

1. After booting from the Windows 2000/XP/2003 CD-ROM, when the Windows Setup blue screen appears, look towards the bottom of the screen. Windows will prompt you to press the F6 key if you want to install a third party SCSI or RAID driver. Press the F6 key at this time.
2. The setup procedure will continue, and will later instruct you to press the "S" key to specify additional adapters. Press the "S" key as instructed.
3. Next, the setup program will prompt for the insertion of the driver diskette. Please insert the driver diskette, and then press ENTER to continue.
4. The next window will display several driver options. Please select the RocketRAID 3xxx Controller for the corresponding operating system, and press ENTER to continue.

Windows Vista Driver Installation

Installing the driver during a fresh Windows Vista installation

1. Boot from Windows Vista DVD.
2. When the screen "where do you want to install Windows" appears, click "Load driver" and browse for the driver location. Windows Vista can install drivers from several media types: floppy diskette, USB flash disk or CD.
3. Select the RocketRAID 3xxx controller driver, and click "Next".
4. The driver is now installed - you can now continue on with the installation procedure.

Installing the driver for an existing Windows Vista system

1. Install the RocketRAID 3xxx host adapter into the PC, then boot up Windows Vista.
2. Windows should automatically detect the card, and display the "Found New Hardware" wizard pop-up window. Select "Locate and install driver software". When Windows asks: "Windows needs your permission to continue", select "continue".
3. Select "I don't have disc, show me other options" and then select "Browse my computer for driver software".
4. Specify the location of the driver and click "Next".
5. When asked: "Would you like to install this driver software?", select "Install".
6. The RocketRAID 3xxx will be available for use after Vista installation.

Installation Verification

After the driver has been installed:

1. Click the Start button, select "Settings", then select "Control panel", double click "System" item.
2. In the popup window, select Hardware tab and then click Device Manager button.
3. Double click the "SCSI and RAID controllers" entry. If the RocketRAID device entry is not displayed, or there are "?" or "!" marks displayed near the RocketRAID entry, the driver has not been installed properly. Delete the entries and reinstall the driver.

Chapter 5
RocketRAID 3xxx
Web-RAID Management Interface

Contents of this Chapter:

1 - Web RAID Management Interface
2 - Preparing Hard disks
3 - Array Management
4 - Device Management
5 - Configuring Spare Disks
6 - Managing Events and Tasks
7 - Settings

1 Web RAID Management Interface

Note: *To use the web-based RAID management interface, a web browser with XML support is required, e.g. Internet Explorer 6.0+, Mozilla, FireFox, or Safari (for OSX systems).*

Starting the Management Interface

To run the management interface, start the web browser and enter the following URL address:

https://localhost:7402

If you are managing a remote system please change "localhost" to the server's host name or IP address.

The default user name is "RAID" and the initial password is "hpt". You can change the password after you have logged in.

Notes:

1) The login information is saved in /etc/hptuser.dat. If you forget the password you can remove this file to reset the password.

2) If you can't connect to the local system, please check and make sure a process named hptsvr is running. If hptsvr is not running, you can start it manually by using the following command (from a terminal window)

/Library/StartupItems/Hptsvr/hptsvr

3) If you can't connect to a remote system, make sure hptsvr is running on that system (and can access the remote system via TCP/IP connection). If you have a firewall configured, make sure TCP port 7402 is not blocked.

Uninstalling (Mac OSX only)

To uninstall the driver and management software, double click the "rr3xxx.dmg" file.

1) Locate and double click the "uninstall.command" file.
2) This will initiate the uninstall script, and will open a Terminal window. Enter the administrator password when prompted, to delete the installed files.

2 Preparing Hard disks

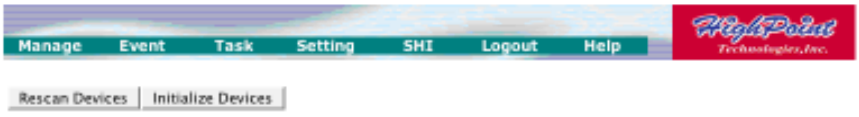
Disks must be initialized before they can be configured into RAID arrays.

Normally, disks only have to be initialized once. The disk initialize process should only take a few seconds.

Initializing disks may result in loss – do not initialize disks unless they are to be configured into RAID arrays.

Initializing hard disks:

1) Select the "Manage - Device" function to access the device management page.
2) Click on the "Initialize Devices" button towards the upper portion of the interface screen.



3) Checkmark each disk you wish to initialize, and click the Submit button.

Warning: *initializing disks may delete data stored on the selected disks.*

Legacy Disks

Disks that already contain data or have been partitioned will be recognized as "Legacy Disks".

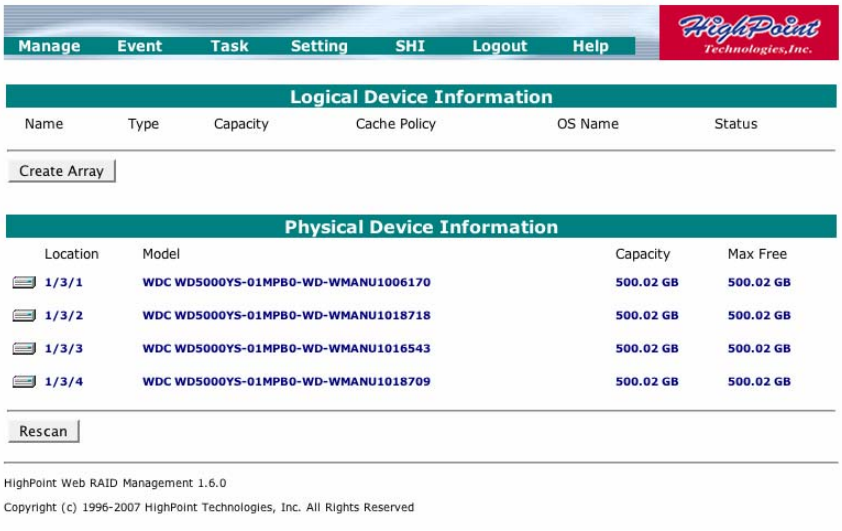
Arrays cannot be created from Legacy Disks. These disks would have to be initialized, which may result in data loss.

3 Array Management

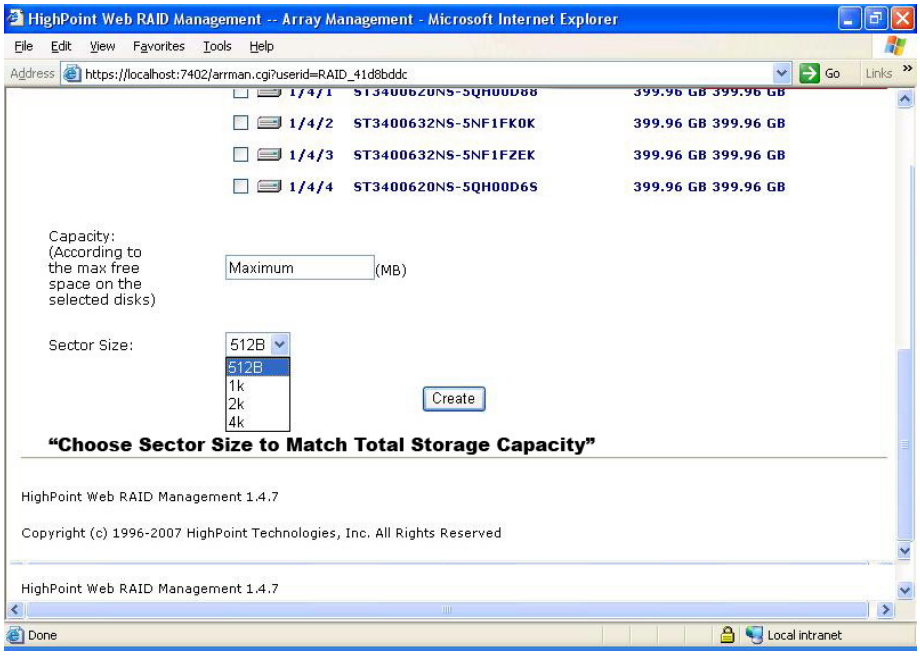
Creating an Array

To create an array:

1. Select "Manage - Array" from the menu.



2. Click the Create Array button. The create array page will appear.



3. Choose the array type you want to create from the drop-down list.
4. Enter a name for the array (this is optional)
5. If you are creating a redundant RAID array (RAID1, 5, 6, 10, 50), select an initialization option for the array.

Note: *An un-initialized RAID1 ,6, 10 or RAID50 array can still provide redundancy in case of a disk failure. A RAID5 array, however, is not fault-tolerant until initialization is finished.*

6. When creating array on IOP RAID controller, All RAID type have cache policy(R5/50/6 is no "None" option.). And if enable write back, data also can be safe even power fail if BBU installed.

Write-back

When the write-back setting is selected, writes to the array are cached. This will result in higher performance, but data loss may occur in case of a power failure.

Write-through

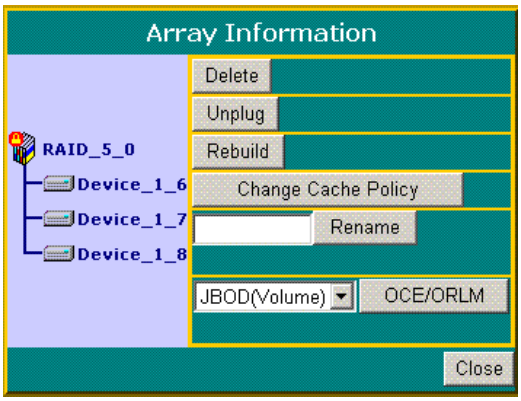
When the write-through setting is selected, writes to the array are always passed directly to the disks. Subsequent reads may still be completed from the cache, if appropriate.

6. Select disks from the Available Disks list.
7. Enter a capacity for the array, or use the default value (the maximum capacity for the array).
8. (VSS) Select Sector Size if needed .
9. Click Create. If you have specified an initialization option, the initialization process will start automatically.

Deleting an Array

To delete an array:

1) Select "Manage - Array" from the menu.
2) Click on the Maintenance button. An Array Information window will appear.



3) Click the Delete button.

Note: *An array in use by the operating system cannot be deleted. Any data stored on a deleted array will be inaccessible.*

Array Maintenance – Rebuilding/Verifying/Modifying RAID arrays

Rebuilding a Failed Array

When an array member in a redundant array fails, the array will be listed as broken. A broken array will be automatically rebuilt using available-spare disks. However, if you have no spare disks configured, you can still rebuild by manually adding an Available Disk to the array. To add a disk to a broken array:

1) Select menu "Manage - Array".
2) Highlight the desired RAID array
3) Click the "Maintenance" button.
4) Click the "Add Disk" button.
5) If the disk is successfully added to the array, rebuild process will start automatically. A progress bar will be displayed.

Note: If the system utilizes hot-swap capable enclosures, you can add new physical disks to the RocketRAID card in order to rebuild or modify an existing array, using the "Rescan" feature.

Reminder: When adding disks manually, make sure to initialize the disk (see Preparing Hard Disks).

Only initialized disks can be used to rebuild RAID arrays.

Verifying an Array

For a RAID 1 or RAID1/0 array, verify process compares the data of one mirror pair with the other. For RAID 5, verify process calculates RAID5 parity and compares it to the parity data on the array. Verification checks each sector on a drive. Periodic verification of an array allows the disk drive firmware to take corrective actions on problem areas on the disk, minimizing the occurrence of uncorrectable read and write errors.

To verify an array:

1) Select menu "Manage - Array".
2) Highlight the desired RAID array
3) Click the "Maintenance" button.

Click the Verify button to start the verify process.

OCE/ORLM – modifying existing RAID arrays

Expanding/Migrating an Array

With the OCE/ORLM function, you can migrate an array from one RAID level to another RAID level and/or expand the array dynamically, even under I/O load. This function implements both Online Capacity Expansion (OCE) and Online RAID Level Migration (ORLM).

To expand/migrate an array:

1) Select "Manage - Array" from the menu.
2) Highlight the desired RAID array
3) Click the "Maintenance" button.
4) Select the target array type.
5) Click the "OCE/ORLM" button.
6) The OCE/ORLM page will appear. The interface is similar to the array creation wizard:

A) When expanding a JBOD array, all the original disks must be included in the target array, and these disks must be selected in the same order (as the original array). If you want to migrate a JBOD array to another RAID level, only the first member disk can be included in the target array. For example, a JBOD comprised of 3 disks (1, 2, 3), can only be "migrated" using disk 1. Disks 2 and 3 cannot be used – disk 1 would have to be combined with other disks attached to the RocketRAID card.

B) You cannot change an array to another type of array with a smaller capacity. In some cases, a disk may need to be added to the RocketRAID card.
During the OCE/ORLM procedure, the redundancy level of the array will be the lowest of the source and target arrays; e.g. if you ORLM a RAID0 array to a RAID1 array, the array will be non-redundant until the procedure is complete.
C) The OCE/ORLM process can be aborted and continued at later time. However, you should always stop the transform progress from the RAID Management software.
An unexpected system crash may result in data loss while performing OCE/ORLM on an array. We strongly recommend backing up data before starting the OCE/ORLM process. After the OCE/ORLM procedure has completed, reboot the system.

Other RAID related Functions

Renaming an Array

You are free to rename RAID arrays. This will not harm the array – data will not be lost.

To rename an array:

1) Select "Manage - Array" from the menu.
2) Highlight the desired RAID array
3) Click on the "Maintenance" button.
4) Enter a new name for the array in the provided field.
5) Click the "Rename" button.

Note: *An array running background tasks cannot be renamed.*

Unplug

This can be used to safely take an entire array offline while the system remains operational.

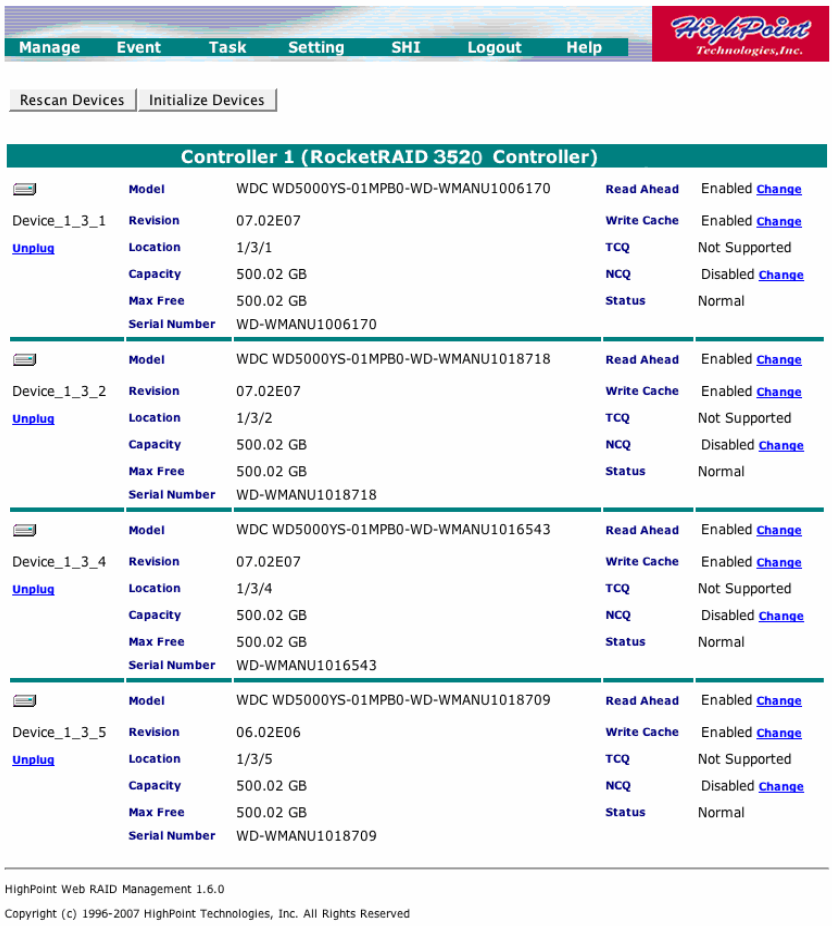
To Unplug an array:

1) Select "Manage - Array" from the menu.
2) Highlight the desired RAID array
3) Click on the "Maintenance" button.
4) Click the "Unplug" button.
5) The software will notify you when it is safe to remove the array.

Note: *Make sure the array is not in use before using this command. Active arrays cannot be unplugged.*

4 Device Management

Select the "Manage - Device" function to access the device management page.



Change Device Settings

Depending upon the capabilities RAID controller and hard disks drives in use, several configurable device settings may be available: Read Ahead, Write Cache, TCQ, and NCQ. Each feature can be enabled or disabled individually, for each hard disk.

Unplug

The Unplug option found below each Device name, can be used to quickly remove (hot-swap) a Legacy disk.

SHI – Storage Health Inspector

The primary SHI interface displays a brief "health" summary of each hard disk.

Controller ID

Which controller /card the disk is attached to.

Port #

Port location of the hard disk

Device Serial Number

Serial number of the hard disk

RAID

RAID/Non-RAID status

F

Temperature (in Fahrenheit) of the hard disk (Celsius is displayed under the SMART status)

Bad Sectors/Found & Repaired

The card is capable of repairing bad sectors – a summary of this activity is presented here.

Device Status

OK means the disk is in a healthy state. A Failed status suggests the disk was taken offline (due to a RAID, SMART or sector failure.

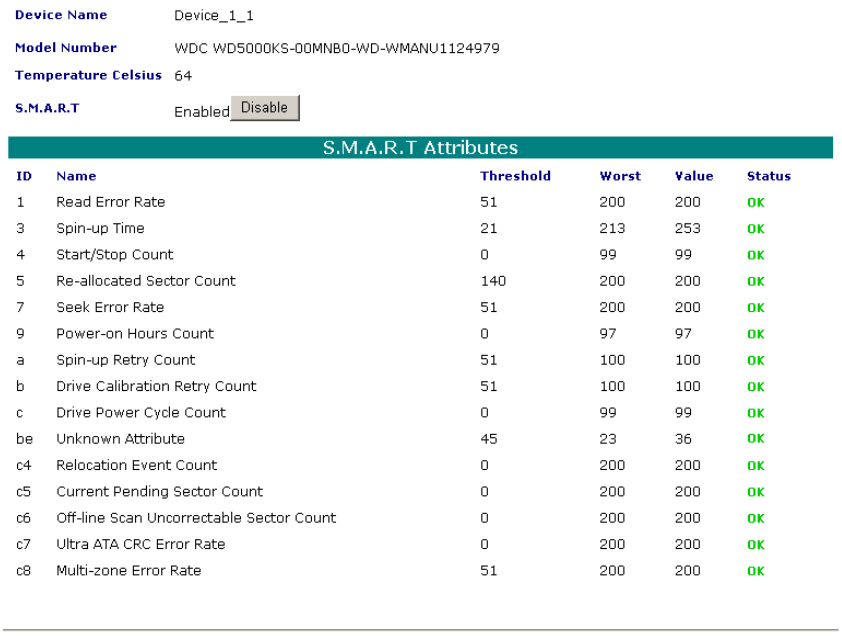
Schedule

Click on the blue "Schedule" link to access the Event menu (see page 12 for more information).

S.M.A.R.T Status

You can view S.M.A.R.T. (Self-Monitoring, Analysis, and Reporting Technology) data about a particular hard disk to help troubleshoot problems that occur. You can also setup periodically S.M.A.R.T. status checking to send notification messages when S.M.A.R.T. thresholds are exceeded.

Click on the blue "SMART" text to view the SMART status of the hard disk.



Device Name	Device_1_1
Model Number	WDC WD5000KS-00MNB0-WD-WMANU1124979
Temperature Celsius	64
S.M.A.R.T	Enabled Disable

S.M.A.R.T Attributes

ID	Name	Threshold	Worst	Value	Status
1	Read Error Rate	51	200	200	OK
3	Spin-up Time	21	213	253	OK
4	Start/Stop Count	0	99	99	OK
5	Re-allocated Sector Count	140	200	200	OK
7	Seek Error Rate	51	200	200	OK
9	Power-on Hours Count	0	97	97	OK
a	Spin-up Retry Count	51	100	100	OK
b	Drive Calibration Retry Count	51	100	100	OK
c	Drive Power Cycle Count	0	99	99	OK
be	Unknown Attribute	45	23	36	OK
c4	Relocation Event Count	0	200	200	OK
c5	Current Pending Sector Count	0	200	200	OK
c6	Off-line Scan Uncorrectable Sector Count	0	200	200	OK
c7	Ultra ATA CRC Error Rate	0	200	200	OK
c8	Multi-zone Error Rate	51	200	200	OK

Note: *S.M.A.R.T attribute data is drive-specific. The software includes a list of definitions for popular drive models/manufacturers. Unknown S.M.A.R.T. attributes will be shown as "unknown". You can add the attribute definitions for your drive in the file smart.def (which resides in the software installation directory).*

Rescan Devices

When you physically add drives to the controller while the system is running, you can rescan the controller to reflect the change.

To rescan the devices:

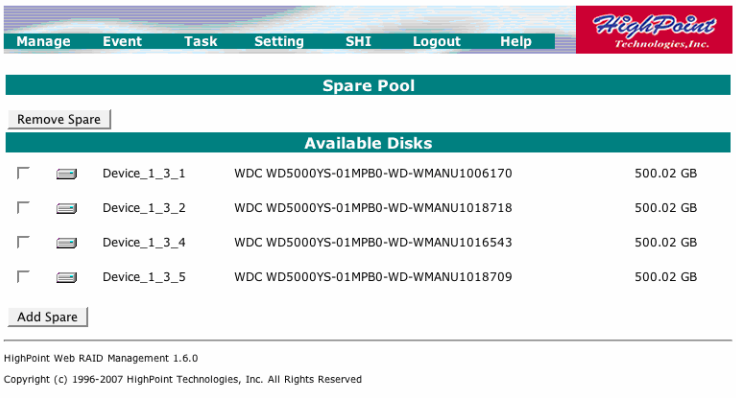
1) Select menu "Manage - Device".

2) Click "Rescan Devices" button.

Note: *When you are hot-plugging an entire array, run rescan only after all array members (hard disks) have been physically plugged or unplugged from the system. You can rescan all the devices at once using the Rescan function on the Array Management page.*

5 Configuring Spare Disks

To configure spare disks attached to the RocketRAID card, select the "Manage - Spare" function. The Spare Pool Management page will be displayed.



Adding a Spare Disk

To add a spare disk, select a disk from the Available Disks list and click the Add Spare button. This will add the disk to the Spare Pool list.

Removing a Spare Disk

To remove a spare disk, select it from the Spare Pool list and click the Remove Spare button. This will remove the disk from the Spare Pool list.

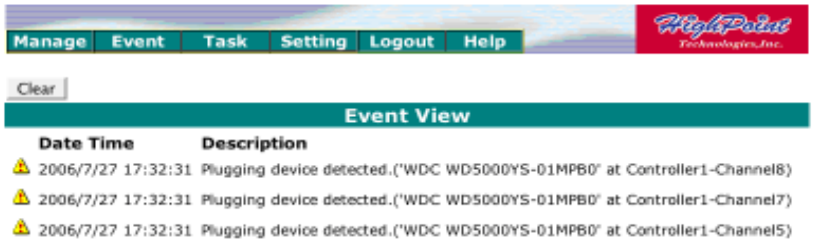
6 Managing Events and Tasks

The HighPoint Web RAID Management Software automatically logs all controller related events that have occurred (for all controllers/cards managed by the software). In addition you can configure E-mail Notification to receive information about these events (see Section 7 Settings -View Events).

Events

Tasks executed by the Management Software, or any disk/array errors reported by the card while the OS is active are known as “Events”. These events are logged (recorded) by the Management Software.

To view logged events, Please select “Event” from the menu. The Event Management page will be displayed.

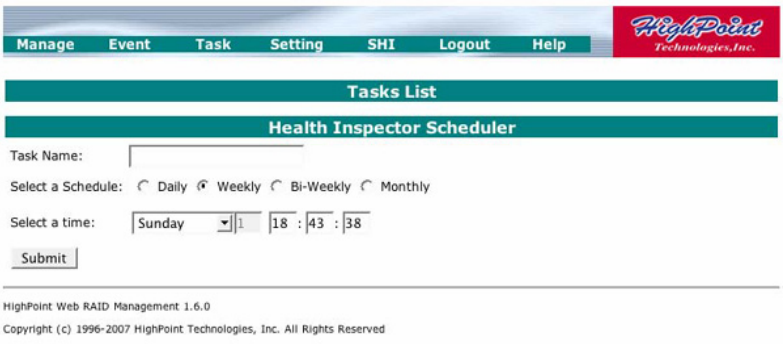


Click the Clear button to clear the event log.

Managing Tasks

With the HighPoint RAID Management Software, you can configure and schedule background rebuild and verify tasks to help maintain the integrity of your drives and data.

You can select menu “Task” to enter Task Management page.



Scheduling a Task

To add a task schedule:

1) Select the array that you want to verify or rebuild.
2) Enter a name for the task.
3) Configure the frequency for the task.
4) Check the Submit button.

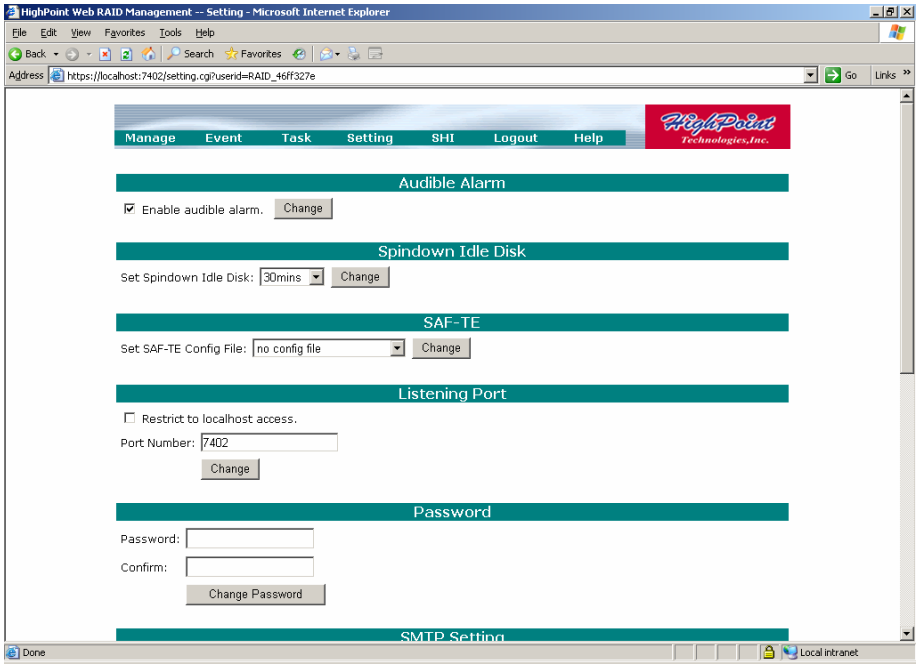
Delete a Scheduled Task

To delete a task schedule:

1) Select a task from the Tasks List.
2) Click the Delete button.

7 Settings

Select the "Settings" option to access Settings page.



Enable Audible Alarm

This setting enables and disables the RR3xxx's alarm.

Listening Port

Change Listening Port

This is the TCP port number utilized by the HighPoint RAID Management Service in order to communicate with the management console and web browser software. When you connect to the service, the port value you enter must be in accordance with the system port value on the service. The default value is 7402.

Enter a new port number and click the "Change Port" button to change the listening port.

Restrict to localhost access

If this option is selected, the HPT Web RAID Management Service will refuse any Remote Access request. Please connect to the local machine by entering "localhost" in the URL bar."

Change Password

This setting allows you to alter the default password (when logging on).

Enter a new password and click the "Change Password" button to change the current user's password.

Enabling E-mail notification:

To configure E-mail notification:

1) Select the "Enable Event Notification" option.
2) Enter the appropriate information for the SMTP server.
3) Click the "Change Setting" button.

Note: *Your SMTP server may require user authentication – enter the appropriate password and username as required.*

To add a Recipient:

1. Enter the necessary information for the desired recipient.

2. Click the Add button.

To test E-mail notification:

1) Enter the necessary information for the recipient.

2) Click the Test button.

If the software is unable to send a test message, an error will be displayed. Double check the recipient entries and make sure the information is correct.

Chapter 6
Linux Driver Support

Contents of this Chapter:

Fedora 7 Linux installation Overview

Red Hat Enterprise 5 Overview

SuSE Linux Enterprise Server (SLES) installation Overview

1 - Fedora 7 Linux installation Overview

This section provides instructions describing how to install and utilize the RocketRAID host adapter on a Fedora 7 Linux system.

2 - Installing Fedora 7 on the RocketRAID 3xxx Host Adapter

Note: If the OS is running kernel that differs from the one supported by the precompiled driver, the precompiled drivers cannot be used. A driver can be built for this kernel using the OpenSource package for the RocketRAID host adapter. This package is available from our website, and is posted on the BIOS/Driver page for the corresponding RocketRAID host adapter.

To install Fedora Linux onto hard disks or RAID arrays attached to RocketRAID host adapter, follow the steps outlined below:

Step 1 Prepare the Driver Diskette

The driver is contained in a floppy diskette image file.

On a DOS or Windows system, a Fedora driver diskette can be generated using rawrite.exe. This utility is included on the Fedora Linux CD (under /dosutils). Run rawrite using a command prompt window, and follow the directions it provides.

On a Linux system, use the “dd” command to generate a boot diskette. Insert a floppy disk into the floppy drive and type the following command:

```
# dd if=fc6-i386.img of=/dev/fd0
```

Note: The driver disk image file depends on your core version and hardware.

Step 2 Install Fedora Linux

Installation steps for Fedora 7

1) Boot from the Fedora Installation CD, and start the install procedure.
2) At the “Welcome to Fedora Linux” installation screen, a prompt labeled “boot:” will appear at the bottom of the screen. Type in “linux dd” and then press Enter.

3) When prompted “Do you have a driver disk?”, select “Yes”. At the “Insert your driver disk and press OK to continue. ” prompt, insert the driver diskette and then select “OK”.

4) The system will now load the RocketRAID driver automatically.

3 - Installing the RocketRAID 3xxx driver for an Existing System

Note: If a SCSI adapter is used to boot the system, make sure the RocketRAID host adapter BIOS loads/posts after the SCSI adapter’s BIOS. It may be necessary to move the adapter(s) to another PCI slot.

Step 1 Obtain the Driver Module

Extract the module file from the file modules.cgz (from the driver disk) using the following commands:

```
# mount /dev/fd0
# cd /tmp
# gzip -dc /media/floppy/modules.cgz | cpio -idumv
```

Driver modules for all supported kernel versions will be extracted. The driver module for the active kernel is located under the directory that matches the kernel version (/tmp/‘uname –r‘/i686/hptiop.ko).

After extracting the driver module, load it using the following commands:

```
# modprobe sd_mod
# insmod hptiop.ko
```

Arrays attached to the adapter can be accessed as SCSI devices (e.g. /dev/sda).

Step 2 Mounting and Partitioning the Device

Example: A RAID array has been configured between several hard disks.
This array will be registered to the system as device “/dev/sda”.

To create a partition on this array (which will listed as /dev/sda1), use the “fdisk /dev/sda” command.

Next, use the “mkfs /dev/sda1” command to setup a file system on this partition.

Step 3 Configure System to Automatically Load the Driver

To avoid typing in "insmod hptiop_00.ko" each time the operating system is booted, the system must be instructed to automatically load the module during bootup. To install the module, type in the following commands (first change to the directory where the proper hptiop_00.ko file is located):

```
#cp hptiop_00.ko /lib/modules/‘uname –r‘/kernel/drivers/scsi.
#depmod
```

Then, instruct the system to load the module when booting. Use the following commands:

```
#echo "modprobe hptiop_00" > /etc/init.d/hptdriver
#chmod 755 /etc/init.d/hptdriver
#ln –sf /etc/init.d/hptdriver /etc/rc.d/rc3.d/S01hptdriver
#ln –sf /etc/init.d/hptdriver /etc/rc.d/rc4.d/S01hptdriver
#ln –sf /etc/init.d/hptdriver /etc/rc.d/rc5.d/S01hptdriver
```

Step 4 Configure System to Mount Volumes during Startup

The system can be instructed to automatically mount the array(s) during startup by modifying the file"/etc/fstab".

For example, add the following line to tell the system to mount /dev/sda1 to location / mnt/raid after startup:

```
/dev/sda1      /mnt/raid        ext3    defaults   0 0
```

4 - Updating the Driver

1.If the original driver is installed in the system's initrd (Initial RAM Disk) file (when using a system installed to RockeRAID host adapter, for example), the driver module in the initrd file should be updated using the **mkinitrd** command (or extract the initrd file and replace the driver module manually).

2.If the original driver is installed in the /lib/modules/‘uname –r‘/kernel/drivers/scsi/ directory, and loaded by the script file (Example /etc/init.d/hptdriver) during the init process, or the configure file (Example /etc/modules.conf), please replace it with the new driver (hptiop_00.o or hptiop_00.ko).

5 - Uninstalling the Driver

To uninstall the RocketRAID 3xxx driver

Note: The driver cannot be uninstalled while the system is booted from a disk or array attached to the RocketRAID host adapter.

To uninstall the driver, remove the lines added to /etc/fstab, and remove the files created in the /etc/init.d directory.

1 - Red Hat Enterprise 5 Overview

This section provides instructions describing how to install and utilize the RocketRAID host adapter on a Red Hat Enterprise 3 Linux system.

2 - Installing Red Hat Enterprise 5 (AS, ES, WS) Linux on the RocketRAID 3xxx controller

To install Red Hat Enterprise Linux onto disks or RAID arrays attached to RocketRAID host adapter:

Step 1 Prepare the Driver Diskette

The driver is provided in a floppy diskette image file format.

On a DOS or Windows system, a driver diskette can be generated using rawrite.exe. This utility is included on the Red Hat Enterprise Linux CD (under /dosutils). Run rawrite using a command prompt window, and follow the directions it provides.

On a Linux system, use the “dd” command to generate a boot diskette. Insert a floppy disk into the floppy drive and type the following command:

dd if= hptiop_00-rhel-4u4.img of=/dev/fd0

Step 2 Install Red Hat Enterprise Linux

Start installing Red Hat Enterprise Linux by booting from the installation CD.

At the “Welcome to Red Hat Linux” installation screen, a prompt labeled “boot:” will appear at the bottom of the screen. Type in **linux dd**, then press Enter.

boot: linux dd

When prompted “Do you have a driver disk?”. Select “Yes”.

When prompted “Insert your driver disk and press OK to continue”, insert the driver diskette into the system’s floppy drive, and select “OK”.

1. The system will now load the RocketRAID driver automatically.
2. When prompted “Where do you want to install the boot loader? ” in the “Boot Loader Configuration” dialog, select “Master Boot Record (MBR)” to instruct the system be to boot from the RocketRAID host adapter.

Continue the installation as normal. You can refer to Red Hat Enterprise Linux installation guide.

Note:

1. The system device mapping order is the same as the order shown in RocketRAID BIOS Setting Utility. If no other SCSI adapters are installed, the device marked as "BOOT" or "HDD0"will identified as */dev/sda*, "HDD1" as */dev/sdb*, "HDD2" as */dev/sdc*, etc. When creating mount points, */boot* must be mounted on */dev/sda*.

3 - Installing the RocketRAID 3xxx driver for an Existing System

Note: If a SCSI adapter is used to boot the system, make sure the RocketRAID host adapter BIOS loads/posts after the SCSI adapter's BIOS. It may be necessary to move the adapter(s) to another PCI slot.

Step 1 Obtain the Driver Module

Extract the module file from the file modules.cgz (from the driver disk) using the following commands:

```
# mount /dev/fd0
# cd /tmp
# gzip -dc /mnt/floppy/modules.cgz | cpio -idumv
```

Driver modules for all supported kernel versions will be extracted. The driver module for the active kernel is located under the directory that matches the kernel version (/tmp/'uname –r'/hptiop_00.ko).

After you have extracted the driver module, you can load it by following commands:

```
# modprobe sd_mod
# insmod hptiop_00.ko
```

Arrays attached to the adapter can be accessed as SCSI devices (e.g. /dev/sda).

Step 2 Mounting and Partitioning the Device

Example: A RAID array has been configured between several hard disks.

This array will be registered to the system as device "/dev/sda".

To create a partition on this array (which will listed as /dev/sda1), use the "fdisk /dev/sda" command.

Next, use the “mkfs /dev/sda1” command to setup a file system on this partition.

Use the command “mkdir *xxxx*” to create a mount point for the RAID array.

Then, mount /dev/sda1 /*xxxx* in order to access it.

Note: *xxxx* represents the desired name of the mount point.

Step 3 Configure System to Automatically Load the Driver

To avoid typing in “insmod hptiop_00.ko” each time the operating system is booted, the system must be instructed to automatically load the module during bootup. To install the module, type in the following commands (first change to the directory where the proper hptiop_00.ko file is located):

```
# install -d /lib/modules/‘uname –r‘/kernel/drivers/scsi
# install -c hptiop_00.ko /lib/modules/‘uname –r‘/kernel/drivers/scsi
```

Then, instruct the system to load the module when booting. Use the following commands:

```
#echo “modprobe hptiop_00” > /etc/init.d/hptdriver
#chmod 755 /etc/init.d/hptdriver
#ln –sf /etc/init.d/hptdriver /etc/rc.d/rc3.d/S01hptdriver
#ln –sf /etc/init.d/hptdriver /etc/rc.d/rc4.d/S01hptdriver
#ln –sf /etc/init.d/hptdriver /etc/rc.d/rc5.d/S01hptdriver
```

Step 4 Configure System to Mount Volumes during Startup

The system can be instructed to automatically mount the array(s) during startup by modifying the file”/etc/fstab”.

For example, add the following line to tell the system to mount /dev/sda1 to location / mnt/raid after startup:

```
/dev/sda1      /mnt/raid        ext2    defaults   0 0
```

4 - Updating the Driver

If you are not booting from disks attached to RocketRAID host adapter, you can update the driver just by reinstalling it following the procedure outlined in the previous section, “Installing the RocketRAID driver for an Existing System”.
If you are running the system installed to a disk or array attached to the RocketRAID host adapter:

First, obtain the new driver module “hptiop_00.ko”. Refer to the previous section “Obtain the Driver Module”. In following steps, we assume it has been copied to “/tmp/hptiop_00.ko”.

Replace hptiop_00.ko in the boot RAM disk image, /boot/initrd-xxx.img (where xxx is the kernel version).

Example:

```
# gzip -dc /boot/initrd-xxx.img > /tmp/initrd.ext2
# mkdir /mnt/initrd
# mount -o loop /tmp/initrd.ext2 /mnt/initrd
# cp /tmp/hptiop_00.ko /mnt/initrd/lib/hptiop_00.ko
# umount /mnt/initrd
# gzip -c /tmp/initrd.ext2 > /boot/initrd-xxx.img
```

If you are using lilo to boot the system, use “lilo” to reinstall the RAM disk:

```
# lilo
```

Update hptiop_00.ko in /lib/modules:

```
# cp /tmp/hptiop_00.ko /lib/modules/‘uname –r‘/kernel/drivers/scsi/hptiop_00.ko
```

Reboot your system to allow the new driver take effect.

5 - Uninstalling the Driver

To uninstall the RocketRAID 3xxx driver

Note: The driver cannot be uninstalled while the system is booted from a disk or array attached to the RocketRAID host adapter.

To uninstall the driver, remove the lines added to /etc/fstab, and remove the files created in the /etc/init.d directory.

1 - SuSE Linux Enterprise Server (SLES) installation Overview

This section provides instructions describing how to install and utilize the RocketRAID host adapter on a SuSE (SLES) Linux system.

2 - Installing SLES Linux on the RocketRAID 3xxx Host Adapter

Note: If the OS is running kernel that differs from the one supported by the precompiled driver, the precompiled drivers cannot be used. A driver can be built for this kernel using the OpenSource package for the RocketRAID host adapter. This package is available from our website, and is posted on the BIOS/Driver page for the corresponding RocketRAID host adapter.

To install SLES onto hard disks or RAID arrays attached to RocketRAID host adapter, follow the steps outlined below:

Step 1 Prepare the Driver Diskette

The driver is contained in a floppy diskette image file (slesdd.img).
On a DOS or Windows system, a driver diskette can be generated using rawrite.exe. This utility is included on the SLES Linux CD (under /dosutils). Run rawrite using a command prompt window, and follow the directions it provides.
On a Linux system, use the "dd" command to generate a boot diskette. Insert a floppy disk into the floppy drive and type the following command:

 # dd if=SLESdd.img of=/dev/fd0

Step 2 Install SLES Linux

1. Start the install procedure by booting from SLES installation CD.
2. After the CD boots, select the "Installation" option and press F6 to load the driver.
3. Insert the Driver Diskette when it displays "Please insert the Driver Update floppy".
4. When the "Diver Update Menu" is displayed, press "OK" and "back" for back to installer.

5. Next. Select “back” to return to the installer.
6. Installation will now proceed normally. Refer to SLES Linux documents for additional OS installation procedures.

Additional Installation Notes:

The system device mapping order is the same as the order shown in RocketRAID host adapter’s BIOS Setting Utility. If no other SCSI adapters are installed, the device marked as “BOOT” or “HDD0” will be identified as */dev/sda*, “HDD1” as */dev/sdb*, “HDD2” as */dev/sdc*, etc. When creating mount points, */boot* must be mounted on */dev/sda*.

3 - Installing the RocketRAID 3xxx Driver on an Existing System

If you are currently running SLES and would like to access drives or arrays attached to the Rocket RAID host adapter, follow the steps outlined below:

Note:

1. If a SCSI adapter is used to boot the system, make sure the RocketRAID host adapter’s BIOS loads/posts after the SCSI adapter’s BIOS. It may be necessary to move the adapter(s) to another PCI slot.
2. The driver may work incorrectly on certain motherboards (such as DFI77B KT400). For these motherboards, add the “acpi=off” kernel parameter in the /boot/grub/menu.lst:

   kernel (hd0,1)/vmlinuz root=/dev/hda1 acpi=off

   initrd (hd0,1)/initrd

Step 1 Update Grub

If you are running an SLES SMP System, you must first update the /boot/grub/menu.lst.

Example:

default=0
timeout=8
title Linux

kernel (hd0,1)/vmlinux root=/dev/hda1 acpi=off
initrd (hd0,1)/initrd
Reboot the system to allow the new kernel parameters to take effect.

Step 2 Install the Driver Module

Extract the module file from the file /linux/suse /[arch]-[version]/install/update.tar.gz (from the driver disk), using the following commands *(SLES 9 is used as an example)*:

```
# mount /dev/fd0 /mnt/floppy
# cd /
# tar xfz /mnt/floppy/linux/suse/i386-sles9/install/update.tar.gz
```

The driver modules will be extracted to the directory /lib/modules/[kernel-ver]/kernel/drivers/scsi/ .

After you have extracted the driver module, you can load it by following commands:

```
# modprobe sd_mod
# insmod hptiop_00.ko
```

Then you can access the arrays attached to the controller as SCSI devices (e.g. /dev/sda).

Step 3 Mounting and Partitioning the Device

Note: Many versions of SuSE include YAST. YAST is a graphical configuration utility that is capable of executing the commands described below. We recommend using YAST, if available, as it may help simplify the installation process.

Example: A RAID array has been configured between several hard disks.

This array will be registered to the system as device "/dev/sda".

1. To create a partition on this array (which will listed as /dev/sda1), use the "fdisk /dev/sda" command.
2. Next, use the "mkfs /dev/sda1" command to setup a file system on this partition.
3. Use the command "mkdir *xxxx*" to create a mount point for the RAID array. Then, mount /dev/sda1 /*xxxx* in order to access it.

Note: *xxxx* represents the desired name of the mount point.

Step 4 Configure System to Automatically Load the Driver

To avoid typing in "insmod hptiop_00.o" each time the operating system is booted, the system must be instructed to automatically load the module during bootup. To install the module, type in the following commands (first change to the directory where the proper hptiop_00.ko file is located):

1. Edit the file "/etc/sysconfig/kernel", and add the hptiop_00 module to the line"INITRD_MODULES=…"

Example:

INITRD_MODULES="reiserfs hptiop_00"

2. Run the "depmod" command to update the module configuration:

   # depmod

3. Next, run the "mkinitrd" command to update the initrd file:

   # mkinitrd

4. If you are using the lilo boot loader, run lilo again:

   # lilo

Step 5 Configure System to Mount Volumes during Startup

The system can be instructed to automatically mount the array(s) during startup by modifying the file"/etc/fstab".

For example, add the following line to tell the system to mount /dev/sda1 to location / mnt/raid after startup:

```
/dev/sda1      /mnt/raid        ext2    defaults   0 0
```

4 - Updating the Driver

To update the driver, simply reinstall the driver following the steps in previous section, " Install RocketRAID driver on an Existing System ".

Note: If the driver is loaded in initrd (when system is installed onto a disk or array attached to the RocketRAID host adapter), you need to run the mkinitrd to command

to update the initrd file. If you are using the lilo boot loader, run lilo again (# lilo).

5 - Uninstalling the Driver

To uninstall the RocketRAID 3xxx driver

Note: The driver cannot be uninstalled while the system is booted from a disk or array attached to the RocketRAID host adapter.

To uninstall the driver, remove the lines added to /etc/modules.conf and /etc/fstab.

Chapter 7
FreeBSD Driver Support

Contents of this Chapter:

1 - Installing FreeBSD on the RocketRAID 3xxx Controller
2 - Installing the RocketRAID 3xxx Driver on an Existing System
3 - Updating the Driver
4 - Uninstalling the Driver

1 - Installing FreeBSD on the RocketRAID 3xxx Controller

If you would like to install FreeBSD onto arrays attached to the RocketRAID host adapter, please follow the steps below.

Step 1 Prepare the Driver Diskette

When installing FreeBSD to a disk or array attached to the RocketRAID host adapter, you must prepare a driver diskette before starting the installation procedure.

First, obtain the driver diskette image file from the driver package.

In a DOS or Windows system, create the boot diskette using the rawrite.exe utility. This utility can be found on the FreeBSD CD (under \tools). Run it under a DOS-Prompt window and follow it's prompt.

On a FreeBSD system, use the "dd" command to make the driver diskette. For example, Insert a floppy disk into the floppy drive and type the following command (if you are installing FreeBSD 5.x versions):

 # dd if=freebsd_5.x.img of=/dev/fd0

Step 2 Install FreeBSD

1. Start the FreeBSD installation procedure by booting from installation CD.
2. If you are installing FreeBSD 5.0 or earlier versions, skip this step. When the "**Welcome to FreeBSD**" screen appears, select "**6**".
3. When the "**Hit [enter] to boot immediately or any other key for command prompt**" screen appears, press the SPACE key to stop the loader from autobooting.

```
BTX loader 1.00  BTX version is 1.01
Console: internal video/keyboard
BIOS driver A: is disk0
BIOS driver B: is disk1
BIOS driver C: is disk2
BIOS 636kB/74512kB available memory
```

```
    FreeBSD/i386 bootstrap loader, Revision 0.8
    (mailto:jkh@narf.osd.bsdi.com, Sat Apr 21 08:46:19 GMT
2001)
    -
    Hit [Enter] to boot immediately, or any other key for
command prompt.
    Booting [kernel] in 9 seconds…

     <-press SPACE key
```

A prompted label "**ok**" will appear at the bottom of the screen

4. Insert the RocketRAID driver diskette into floppy drive. Type in "**load diskx: hptiop_00-x.x**" (without quotation marks), and then press **enter**.

```
for FreeBSD 4.3-RELEASE
 ok load kernel
 ok load disk1:hptiop_00-4.3.ko

for FreeBSD 4.4-RELEASE
  ok load kernel
  ok load disk1:hptiop_00-4.4.ko

for FreeBSD 4.5-RELEASE
  ok load disk1:hptiop_00-4.5.ko

for FreeBSD 4.6.2-RELEASE
  ok load disk1:hptiop_00-4.6.2.ko

for FreeBSD 4.7-RELEASE
  ok load disk1:hptiop_00-4.7.ko

for FreeBSD 4.8-RELEASE
  ok load disk1:hptiop_00-4.8.ko

for FreeBSD 4.9-RELEASE
  ok load disk1:hptiop_00-4.9.ko

for FreeBSD 4.10-RELEASE
  ok load disk1:hptiop_00-4.10.ko
```

```
for FreeBSD 4.11-RELEASE
  ok load disk1:hptiop_00-4.11.ko

for FreeBSD 5.0-RELEASE
  ok load disk0:hptiop_00-5.0.ko

for FreeBSD 5.1-RELEASE
  ok load disk0:hptiop_00-5.1.ko

for FreeBSD 5.2.1-RELEASE
  ok load disk0:hptiop_00-5.2.1.ko

for FreeBSD 5.3-RELEASE
  ok load disk0:hptiop_00-5.3.ko

 for FreeBSD 5.4-RELEASE
  ok load disk0:hptiop_00-5.4.ko

 for FreeBSD 5.3-AMD64-RELEASE
  ok load disk0:hptiop_00-5.3-amd64.ko

 for FreeBSD 5.4-AMD64-RELEASE
  ok load disk0:hptiop_00-5.4-amd64.ko

for FreeBSD 6.0-AMD64-RELEASE
  ok load disk0:hptiop_00-6.0-amd64.ko

for FreeBSD 6.1-RELEASE
  ok load disk0: hptiop_00-6.1.ko

for FreeBSD 6.1-AMD64-RELEASE
   ok load disk0: hptiop_00-6.1-amd64.ko
```

5. After the driver has been loaded, remove the floppy diskette from the floppy drive.
6. Type in “boot” and continue with installation as normal. Refer to FreeBSD installation guide for additional information.

```
ok boot
```

Note: *On some systems, when ACPI is enabled, FreeBSD may not function properly. Try disabling ACPI in the motherboard's BIOS settings, or type the command "**set hint.acpi.0.disabled="1"**" under the boot prompt, in order to solve the problem.*

7. Before exiting installation, an additional step must be taken to copy the RocketRAID driver module to the system. On the driver diskette, there is a setup script labeled "**postinstall**", which will complete this task. Before rebooting the system, press **Alt-F4** to enter the command shell, and type the following commands:

```
# mount -o ro /dev/fd0 /mnt
# sh /mnt/postinstall
# umount /mnt
```

Then, press **Alt-F1** to return to the setup screen, and choose **[X Exit Install]** to finish setup.

2 - Installing the RocketRAID 3xxx Driver on an Existing System

If you are currently running FreeBSD and would like to access drives or arrays attached to the RocketRAID host adapter, follow the steps outlined below:

Step 1 Copy the Driver Module

If you have made FreeBSD drivers into a diskette, you can insert the driver diskette to floppy drive, then using the following commands to copy the driver module:

```
For FreeBSD 4.x:
# mount -o ro /dev/fd0 /mnt
# cp /mnt/hptiop_00-xxx.ko /modules/hptiop_00.ko
# umount /mnt
For FreeBSD 5.x:
# mount -o ro /dev/fd0 /mnt
# cp /mnt/hptiop_00-xxx.ko /boot/kernel/hptiop_00.ko
# umount /mnt
```

Alternately, it is possible extract the files from the .img files directly, without using a floppy diskette:

```
For FreeBSD 4.x:
# vnconfig vn0c freebsd_xxx.img
# mount /dev/vn0c /mnt
# cp /mnt/hptiop_00-xxx.ko /modules/hptiop_00.ko
# vnconfig -du vn0c myfilesystem mount=/mnt

For FreeBSD 5.x:
# mdconfig -a -t vnode -f freebsd_5.x.img -u 0
# mount /dev/md0 /mnt
# cp /mnt/hptiop_00-xxx.ko /boot/kernel/hptiop_00.ko
# umount /mnt
# mdconfig -d -u md0
```

Step 2 Test the Driver Module

Test the driver module to ensure that it works with the system, by loading it during bootup. If the module has been loaded successfully you should see the RocketRAID banner and a display screen of the attached drives. You can now access the drives as a SCSI device.

Note: *If you have no other SCSI device, the first device is /dev/da0, then /dev/da1,* etc.).

Example: F1 FreeBSD

```
Default: F1

>> FreeBSD/i386 BOOT
Default: 0:ad(0,a)/boot/loader
boot:

BTX loader 1.00  BTX version is 1.01
Console: internal video/keyboard
BIOS driver A: is disk0
BIOS driver C: is disk2
BIOS 636kB/74512kB available memory

FreeBSD/i386 bootstrap loader, Revision 0.8
(mailto:jkh@narf.osd.bsdi.com, Sat Apr 21 08:46:19 GMT 2001)
Loading /boot/defaults/loader.conf
/kernel text=0x24f1db data=0x3007ec+0x2062c -
```

```
     <- For FreeBSD 5.1 and later: select "6" on "Welcome to
FreeBSD" screen.
     Hit [Enter] to boot immediately, or any other key for
command prompt.
     Booting [kernel] in 9 seconds…

      <-press SPACE key
     Type '?' for a list of commands, 'help' for more de-
tailed help.
     ok load hptiop_00
     /modules/hptiop_00.ko text=0xf571 data=0x2c8+0x254
     ok autoboot
```

Note: *If you have configured a RAID 10 using 4 disks, it will be registered to system as device* ***/dev/da0****. You can use "****/stand/sysinstall****" to create partitions and disklabels (like da0s1e) on* ***da0****. Then, create a new filesystem using "****newfs /dev/da0s1e****". Now you can mount* ***/dev/da0s1e*** *to somewhere to access it*

Step 3 Configure System to Automatically Load the Driver

To avoid typing in "load hptiop_00" each time the operating system is booted, the system must be instructed to automatically load the module during bootup. To configure the system to automatically install the module, type in the following commands:

 # echo 'hptiop_00_load="YES"' >> /boot/defaults/loader.conf

This command will instruct the loader to load the RocketRAID module together with the kernel. After using this command, reboot the system. The RocketRAID module should now automatically load each time the operating system starts up.

Note: *When using FreeBSD 4.x, type in the following command to configure the system:*

 # mknod /dev/hptiop_00 c 200 0

Then, check to make sure the node "/dev/hptiop_00", is present in the /dev directory.

Step 4 Configure the System to Mount Volumes at Startup

Instruct the system to automatically mount the array by modifying the file /etc/fstab.

Example: Add the following line to instruct the system to mount /dev/da1s1e to location /mnt/hpt after startup:

/dev/da1s1e /mnt/hpt ufs rw 0 0

3 - Updating the Driver

To update the driver with a newer revision, simply reinstall the driver following the steps discussed in the previous section, "*Install the driver on an existing system*".

4 - Uninstalling the Driver

The driver can only be uninstalled when the system is not booting from devices attached to the RocketRAID host adapter. To uninstall, remove the line hptiop_00_load="YES" located in */boot/defaults/loader.conf*, and then delete the driver module /modules/hptiop_00.ko or /boot/kernel/hptiop_00.ko.

Chapter 8

Mac OSX Driver

Contents of this Chapter:

Installing the driver and RAID utility

1 Installing the driver and RAID utility

Installing the package

1) Double click the package labeled "**rr3xxx_00-MacOSX-universal-vxxx.dmg**" to start the installation process *("xxx" refers to the revision of the driver)*. This will open the driver and software packag.

2) Double click the **"rr3xxx_00-MacOSX-universal-vxxx.dmg"** file to start the installer:

3) When the Installer window opens, click the "**Continue**" button.

Install HighPoint RR3xxx RAID Controller
Welcome to the HighPoint RR3xxx RAID Controller Installer
Introduction
Welcome to the Mac OS X Installation Program. You will be guided through the steps necessary to install this software.
Install
Go Back
Continue

4) The installer will ask you to select a destination for the driver. Make sure to select the boot Volume - the driver must be installed to /System/Library/Extensions/ folder in order to function properly.

5) Click the "Install" button.

   You will be prompted: "clicking the install button will install a basic installation of the software package on your selected volume". Confirm the prompt to install the software package.

6) You will then be notified that a reboot is needed to install the software. Click "Continue Installation**".**

7) The driver will then be installed into the system. Click "Restart" to restart the system.

After the system restarts, you can use a web browser to configure the controller and setup RAID arrays. Use the MacOSX Disk Utility to create partitions the RAID arrays.

Web RAID Management Utility

Please refer to page 5-1 – the Web utility utilizes a universal interface, and operates in the same manner as revisions released for other operating systems.

Appendix
Customer Support

HighPoint

Customer Support

If you encounter any problems while utilizing the RocketRAID 3xxx, or have any questions about this or any other HighPoint product, feel free to contact our Customer Support Department.

Troubleshooting Checklist

Before contacting our Customer Support department:

Make sure the latest BIOS, driver and RAID Software have been installed for the RocketRAID 3xxx. Updates are available from our website.

Prepare a list of the computer system's hardware and software (motherboard, CPU, memory, other PCI devices/host adapters, operating system, applications)

Contact Information

E-mail address: support@highpoint-tech.com

Phone: 408-942-5800 (request for support)

9:00AM-6:00PM, Pacific Standard Time

Additional information about HighPoint products is available from our web site:

http://www.highpoint-tech.com

FCC Part 15 Class B Radio Frequency Interference statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment under FCC rules.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

European Union Compliance Statement

This Information Technologies Equipment has been tested and found to comply

with the following European directives:

- European Standard EN55022 (1998) Class B
- European Standard EN55024 (1998)